

Superfund Records Center
SITE: Vitale Flyash Pit
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FINAL SITE INSPECTION PRIORITIZATION REPORT

VITALE FLYASH PIT

BEVERLY, MA

Prepared for:

U.S. ENVIRONMENTAL PROTECTION AGENCY NEW ENGLAND
Office of Site Remediation and Restoration
Boston, MA

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Final Site Inspection Report
Vitale Flyash Pit
L.P. Henderson Road

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INTRODUCTION

Stone & Webster Environmental Technology & Services (Stone & Webster) was requested by the U.S. Environmental Protection Agency New England (EPA) to perform a Site Inspection Prioritization (SIP) of the Vitale Flyash Pit in Beverly, Massachusetts. All tasks were conducted in accordance with the New England Corps of Engineers Contract No. DACW33-94-D-0007, which was issued to Stone & Webster on December 30, 1994. The former Massachusetts Department of Environmental Quality Engineering, now the Massachusetts Department of Environmental Protection (MA DEP), performed a Preliminary Assessment (PA), of this property in December 1987, and a Screening Site Inspection (SSI) was conducted by MA DEP for the EPA Region I in November 1988. Updated information since the last EPA activity encountered during the SIP process is included in this report. Relevant text from the Screening Site Inspection Summary report is presented in this report in italics.

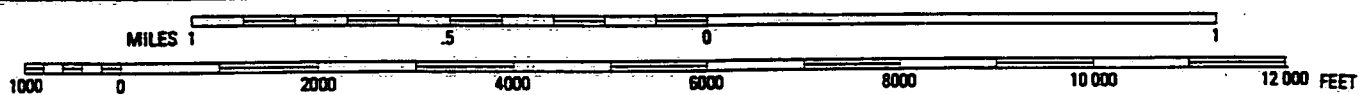
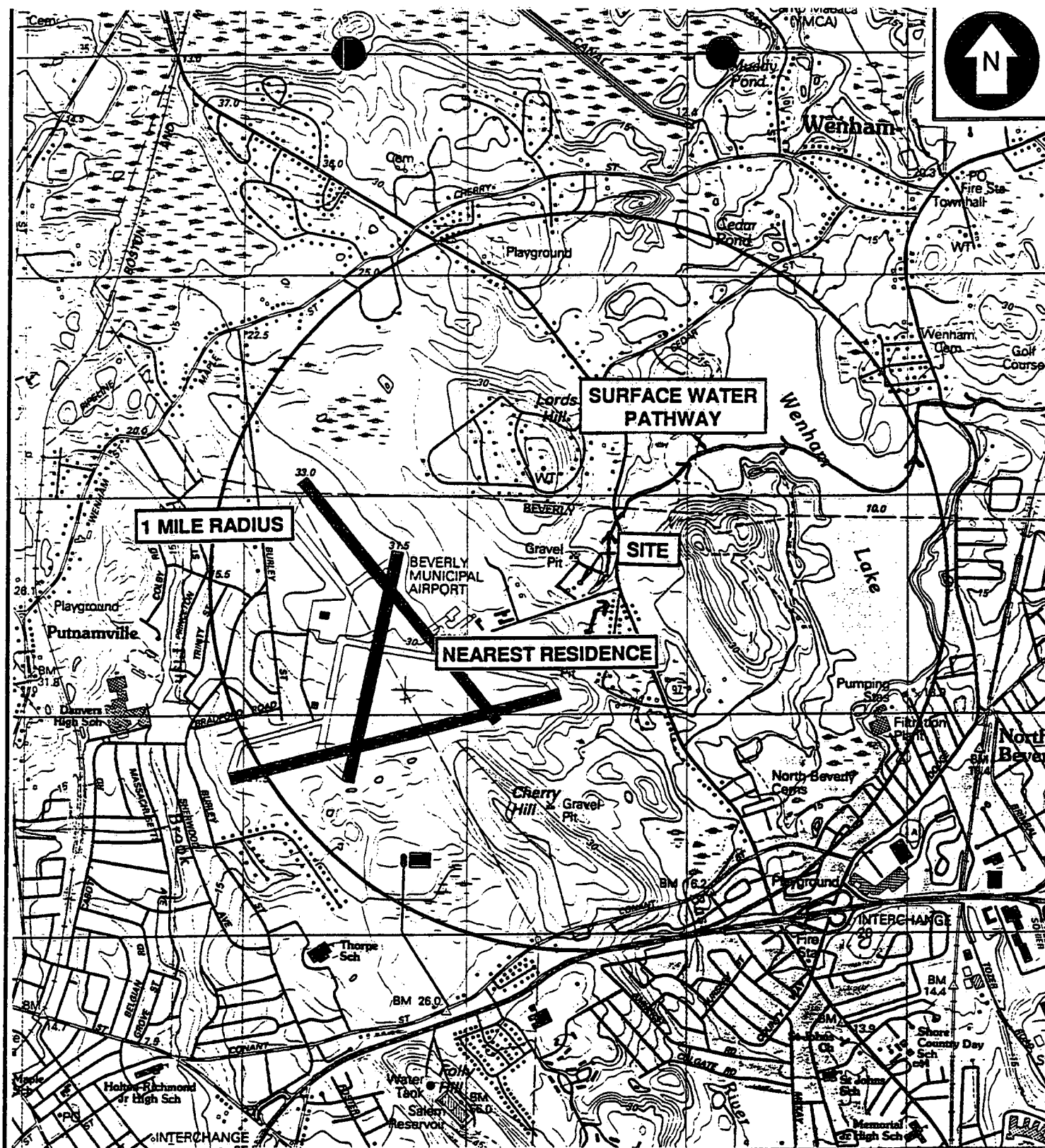
Background information used in the generation of this report was obtained through file searches conducted at the MA DEP and the Beverly City Hall (Board of Health, Assessors Office, Fire Department and Planning Departments), telephone interviews with town and city water departments, the site contact and their environmental consultant, information obtained through computer database searches, and conversations with other federal, state, and local agencies. Additional information was obtained during Stone & Webster's onsite reconnaissance on May 16, 1995.

This package follows guidelines developed under the Comprehensive Environmental Response, Compensation and Liability Act of 1980 (CERCLA), as amended, commonly referred to as Superfund. However, these documents do not necessarily fulfill the requirements of other EPA regulations, such as those under the Resource Conservation and Recovery Act (RCRA) or other federal, state, and local regulations. An SIP is intended to provide a preliminary screening of sites to facilitate EPA's assignment of site priorities. It is a limited effort, and is not intended to supersede more detailed investigations.

SITE DESCRIPTION

The Vitale Flyash Pit is located on the corner of L.P. Henderson Road and Cabot Street (Route 97) in Beverly, Massachusetts. The site is located at 42° 54' 27" north latitude and 70° 35' 16" west longitude in the northeast section of the Salem, MA, U.S.G.S., 7.5 x 15 minute topographic map (Figure 1). The Vitale Flyash Pit is designated as lot 6 on map 90 of the City of Beverly's Tax Assessor's plot map.

The Vitale Flyash Pit is bordered to the north and the west by the Kelleher Property, which is also known as the Burnham Land Trust Property. This property consists of vacant forested land. The flyash pit is bordered to the southwest by the former army NIKE missile site which is currently owned by the City of Beverly. South of the flyash pit is the the Airport Stream and L.P. Henderson Road and across L.P. Henderson Road is the Orne Property also called the Filtek Property. East of the site is the Airport Stream and Route 97 (Cabot Street). Across Route 97 is vacant farm land (Weston & Sampson, 1989).



BASE MAP IS A PORTION OF THE SALEM (1985)
MASSACHUSETTS 15 MINUTE SERIES USGS
TOPOGRAPHIC MAP.



Stone & Webster
Environmental Technology
and Services
Boston, Massachusetts

Date: 11-27-95
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Site Location Map
VITALE SITE
Figure 1

The entire 18-acre site is filled with fly ash, ranging from 15 to 30 feet in depth. In addition to the disposal of fly ash, other types of waste may have been disposed of at the site. During a DEP inspection in March 1987, piles of solid waste and other demolition debris were observed at the site. In 1986, DEP inspectors observed an area of "oil-stained soil" in the vicinity of four underground storage tanks. The SSI was not specific in describing the location for the tanks, only stating that they were near the one story structure building. The four tanks contained gasoline, diesel fuel, heating oil and slop oil, respectively. The tanks were removed in 1987 along with seventy-five cubic feet of contaminated soil (MADEP, 1987; MADEP, 1988). Piles of junk and solid waste were also noticed during the May 16, 1995 Stone & Webster site reconnaissance (S&W, 1995f). The area of stained soil was not observed during the Stone & Webster site reconnaissance (S&W, 1995f).

Figure 2 depicts site features of the Vitale Flyash Pit. Vegetation covers most of the filled portion of the site. There is one building on the site which is accessed via a driveway off L.P. Henderson Road. The single one-story structure housed offices and a garage used for automotive repairs associated with the Vitale Construction Company (MA DEP, 1988). The structure was partially destroyed by a fire on October 17, 1992 (S&W, 1995a). Wetlands associated with the Airport Stream bordering the site to the northeast have been partially filled by the erosion of fly ash from the site. There are a number of junked vehicles (trucks, cars, trailers and an excavator), junk piles containing vehicle parts and house hold appliances (refrigerators, washing machines, dryers) and tires. Other piles on the site observed during the Stone & Webster site reconnaissance include shingles, asphalt, ledge and vegetated mounds (most likely fly ash piles). Two unlabeled 55 gallon drums were noted at the locked access gate of the site and a crushed drum containing tyvek waste was observed behind the one-story structure. On the southwestern portion of the site were two wooden structures (resembling pens). These rundown structures were apparently constructed from a six foot picket fence. There was a total of twelve monitoring wells on site.

The nearest residence is located 500 feet to the east of the site on Trask Lane (Frost, 1995, Aerial Photo, 1987). There is a locked gate and rock barriers to prevent vehicle trespassing, however, pedestrian public access is unrestricted.

OPERATIONAL AND REGULATORY HISTORY AND WASTE CHARACTERISTICS

The Vitale Flyash Pit is currently owned by the City of Beverly Conservation Commission. The parcel was initially used as a gravel and sand mine when acquired in the 1950's by Stephen and Michael Vitale. The sand and gravel mined from the site was used as clean fill for their construction business. The New England Power Company had an arrangement with the Vitale brothers to dispose of salt water quenched fly ash generated from the Salem Power Station within the excavated gravel pits on the property. In 1980, the City of Beverly reposessed ownership of the site from the Vitale brothers due to their failure to pay real estate taxes. The site is currently abandoned (MA DEP, 1987).

A Preliminary Assessment (PA) for the Vitale Flyash Pit was conducted by the MA DEP in December 1987, who recommended a high priority for a Site Inspection based on the threat the site may pose to a nearby drinking water supply (MA DEP, 1987). A Site Screening Inspection (SSI) for the site was conducted in November 1988, by the MA DEP recommending a second round of sampling be conducted based on ammonia, halogenated compounds and gasoline contamination detected in the groundwater and fly ash samples at the site (MA DEP, 1988).

The Vitale Flyash Pit has a long record of noncompliance with local and State laws and regulations. The first official documentation of this in MA DEP records is a letter dated March 25, 1969 regarding a Massachusetts Division of Water Pollution Control inspection of the Vitale property. The document noted that holes at the site were being filled with fly ash without the necessary Beverly Board of Health permit, as required by MGL Chapter 11 Section 150A.

On September 17, 1971 a Subpoena, Notice and Restraining Order were issued by the Department of Wetlands to Michael and Stephen Vitale, their construction companies and subcontractors to refrain from any more work impacting the wetland at the site as it is a violation of MGL Chapter 131 Section 40. On June 13, 1973, the Massachusetts Department of Natural Resources (DNR) sent a letter to Stephen Vitale notifying him that residents living on Trask Lane 500 feet away to the east, have complained that fly ash is eroding into the swamp and stream causing a damming effect and flooding their yards. Additionally, these neighbors complained of a "severe dust problem" in the summer months when the fly ash dumped on-site dries and becomes airborne. DNR requested that Mr. Vitale immediately stabilize the piles of fly ash.

On August 26, 1974, the Beverly Board of Health notified Steven Vitale that the fly ash disposal area constituted illegal disposal and was in violation of MGL Chapter 111, Section 122. Mr. Vitale was also notified that this filling was also a violation of the Hatch Act in addition to creating a water pollution problem.

On February 24, 1975, the Massachusetts Department of Public Health (DPH) issued an order to Michael and Stephen Vitale and their associated construction companies. The violations cited in this Order were:

1. The site is being used as a solid waste disposal area and was never assigned by the Beverly Board of Health under MGL Chapter 111, Section 150A as an approved site for disposal of refuse.
2. Waste from the site is being released into Airport Stream and Wenham Lake.
3. Conditions at the site constitute a nuisance and an interference with public health.

Stephen Vitale was ordered to:

1. Prevent siltation and pollution of the stream.
2. Cut back the slope to the wetland, grade, cap and vegetate the site.
3. Commence and complete work within given time frames.

From the time of the DPH Order to 1980 (when the City of Beverly took control of the property), the Vitale's have ignored all subsequent DPH and DEP orders, request hearings, etc. resulting in litigation with DPH and DEP, through the Office of the Attorney General.

The Vitale Flyash Pit is not listed in the RCRA Directory and has no RCRA information on file at the DEP in Woburn, MA. Table 1 and Table 2 summarize the CERCLA Sites and RCRA Facilities located within a one mile radius of the Vitale Flyash Pit.

TABLE 1: CERCLA SITES LOCATED WITHIN ONE-MILE RADIUS OF THE VITALE FLYASH PIT

Facility Name	Address	Distance/Direction from Site	CERCLA Number
Filtek	L.P. Henderson Road, Beverly	0.6/SE	MAD 985278043
Casco Chemical	L.P. Henderson Road, Beverly	0.2/SE	MAD 981068273
Airport Septic System	L.P. Henderson Road, Beverly	0.3/SE	MAD 981069525

(N.E. DataMap Technology Corp., 1995)

**TABLE 2: RCRA SITES LOCATED WITHIN ONE-MILE RADIUS OF
THE VITALE FLYASH PIT**

Facility Name	Address	Distance/Direction from Site	CERCLA Number
Amicon Div., W.R. Grace	72 Cherry Hill Drive, Beverly	0.7/SE	MAD 982710907
Eaton Corp.	108 Cherry Hill Drive, Beverly	0.9/SE	MAD 106768344
Grünard Mfg. Co. Inc.	L.P. Henderson Road, Beverly	0.2/SE	MAD 001058098
Eaton Corp.	108 Cherry Hill Road, Beverly	0.9/SE	MAD 106768344
North Shore Reg. Voc.	20 Balch Street, Beverly	Non/GC	MAD 981892300
Applied Biomedical Corp.	33 Cherry Hill Drive, Danvers	0.7/SW	MAD 050636737
Omni Aero Maintenance	Beverly Airport, West Side, Danvers	0.7/SW	MAD 099188773
Burnetts Garage Inc.	60 Maple Street, Wenham	1.0/NW	MAD 019694488

Non/GC = Non Geocoded Ref: (N.E. DataMap Technology Corp., 1995)

Investigations for the site abutting the Vitale Flyash Pit include a Comprehensive Environmental Assessment report conducted by Weston and Sampson Engineers, Inc. in October, 1989 on the Kelleher Property and a Site Evaluation conducted by Gulf of Maine research Center Inc. in September, 1986 of the Burnham Land Trust (which are the same property)(Weston & Sampson, 1989; Gulf of Maine, 1986).

The Site Evaluation of the Burnham Trust conducted by Gulf of Maine Research Center, Inc. in September, 1986 consisted of subsurface soil and groundwater testing. Soil samples were collected from three borings and analyzed for total RCRA Metals, volatile halocarbons, and aromatics. Soil samples showed non-detectable levels of volatile halocarbons and aromatics. The metals detected in the soil were compared with the amounts which normally occur in natural U.S. soils. The soil sampling results are as follows (Gulf of Maine, 1986):

- Chromium was found at levels below the average in all samples.
- One soil sample reflected concentrations of Barium above the average, but within the normal range at 641.4 mg/kg.
- Lead and mercury in soil was found above the average but within the normal range at concentrations ranging from 20.7 -53 mg/kg for lead and concentrations ranging from 0.7-0.10 mg/kg for mercury.
- Cadmium was found in all samples at levels exceeding the natural range (from 3 to 7.5 times higher than the highest naturally occurring value) at concentrations ranging from 2.00-5.3 mg/kg.

Groundwater samples from the property were collected from three monitoring wells and analyzed for total RCRA metals, volatile halocarbons and aromatics. The results of the groundwater sampling are as follows (Gulf of Maine, 1989):

- OSW-3 contained trace amounts (1 part per billion) of 1,1,2,2-tetrachloroethane.
- Barium was detected at levels above the maximum allowable drinking water standards at concentrations ranging from 3.64-11.8 mg/L.
- Cadmium was detected at levels above the maximum allowable drinking water standards at concentrations ranging from 0.16-0.28 mg/L.
- Chromium was detected at levels above the maximum allowable drinking water standards at concentrations ranging from 0.46-0.88 mg/L.
- Lead was detected at levels above the maximum allowable drinking water standards at concentrations ranging from 0.90-1.64 mg/L.

Gulf of Maine Research Center, Inc. concluded in this report that no sources of contamination exist on the Burnham Trust Property (Gulf of Maine, 1989). However, several possible sources of contamination exist on adjacent sites, principally the Vitale Flyash Pit. Subsurface soil samples and groundwater testing indicate an elevated level of cadmium in the soils of the Burnham Trust Property, and levels of barium, cadmium, lead, mercury, and selenium in the groundwater equal or exceed the drinking water standards. These metals are known to be present in fly and bottom ash and may be leaching out from the material deposited on the Vitale Flyash Pit. The various metallic solid wastes on the Vitale Flyash Pit site could also be a source of contamination (Gulf of Maine, 1989).

The Kelleher Property Comprehensive Environmental Assessment consisted of soil and groundwater testing of the 59 acre parcel property which abuts the Vitale Flyash Pit to the north and west (shown on Figure 2). Five soil samples from the test pits were collected by Weston & Sampson and analyzed by Cambridge Analytical Associates for Total Petroleum Hydrocarbons (TPH) and Volatile Organic Compounds (VOC). Three soil samples were selected for analysis based upon elevated headspace screening results. A sediment sample was collected near the surface in the wetland. This was chosen to address the possibility of contaminants migrating from the Vitale Property via surface water. This sample was analyzed for metals in addition to VOCs and TPH because of the possible impact from ash. The findings were as follows; carbon disulfide (VOC) was detected in one of the test pits (TP-3) at 19 parts per billion and TPHs were detected at 170 parts per million from test pit W&S TP-4 (See Figure 3). Metals were not detected above background concentrations (Weston & Sampson, 1989).

Groundwater samples from the Kelleher property were collected from seven monitoring wells and were analyzed for VOCs, TPH, and thirteen metals. Results from the sampling detected carbon disulfide in four of the monitoring wells at concentrations ranging between 15 to 51 parts per billion, and TPH was detected at 14 parts per million. Two metals exceeding Massachusetts Drinking Water Standards (MDWS) were detected in two wells. These metals were silver at 0.117 ppm and selenium 0.030 ppm. All other metals were either detected below the MDWS or were not found at concentrations above detection limits (Weston & Sampson, 1989).

This report also identified the Orne Property as a potential source of VOCs and cyanide (also called Filtek located on the south side of L.P. Henderson Road, Figure 2, located up gradient of both the Vitale Flyash Pit and the Kelleher Properties). The Orne property served as disposal area for coal gasification wastes from which cyanides and VOCs have been identified in the groundwater. Up gradient wells on the Vitale Flyash Pit reflected greater concentrations of VOCs than did the down gradient wells. The Orne property is suspected of being the source of the VOCs (Weston & Sampson, 1989). This property is currently under going remediation (S&W, 1995f).

Table 3 below lists the potential sources for the Vitale Flyash Pit, and Table 4 on page 8 lists the hazardous waste quantity for the Vitale Flyash Pit.

TABLE 3: SOURCE EVALUATION FOR THE VITALE FLYASH PIT

Potential Source Area	Containment Factors	Spatial Location
entire site	none	18 acres

[MA DEP, 1988]

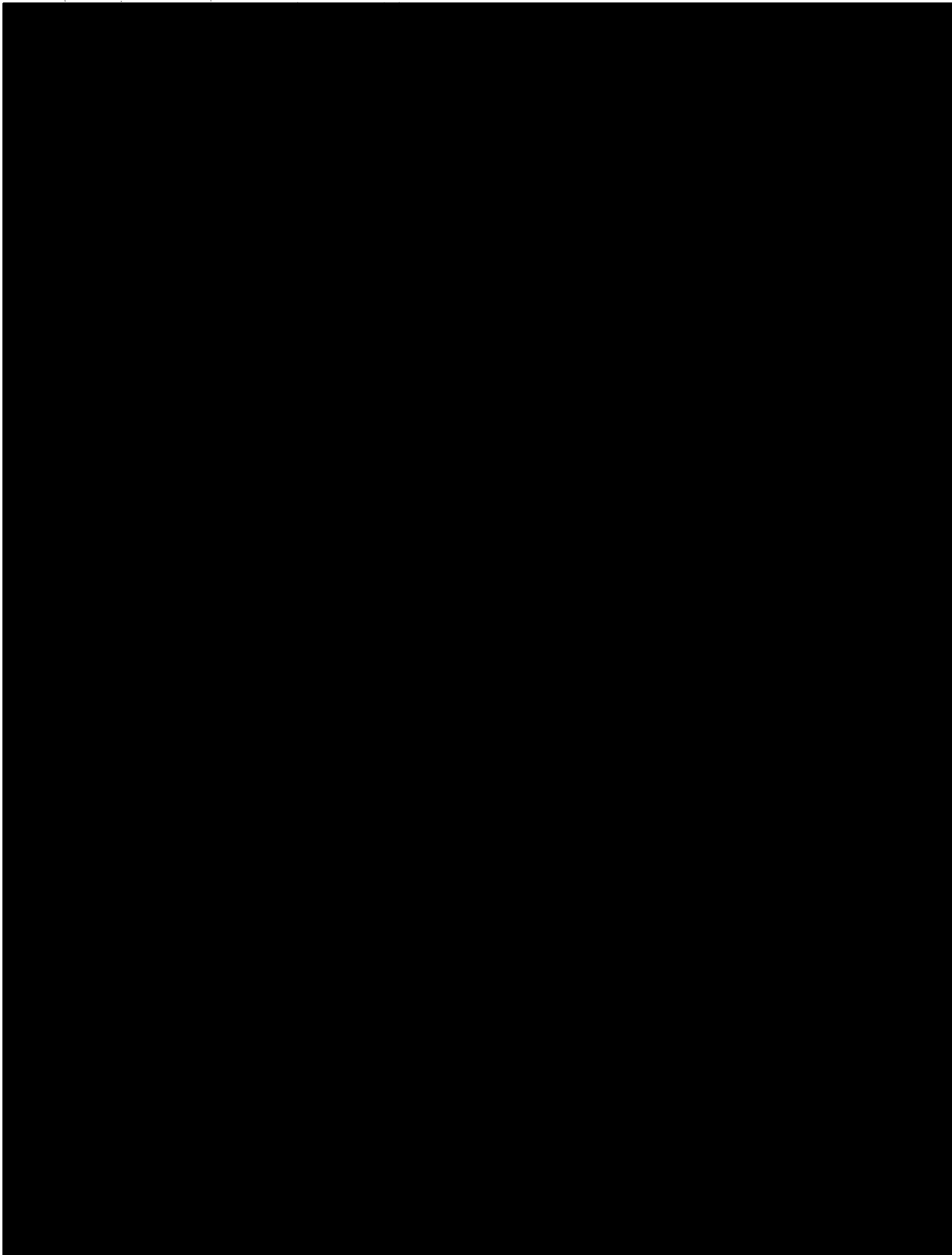


TABLE 4: HAZARDOUS WASTE QUANTITY FOR THE VITALE FLYASH PIT

Substance	Quantity or Volume/Area	Years of Use/Storage	Years of Disposal	Source Area
Fly ash	entire site (18 acres)	unknown	unknown	entire site
Refuse	throughout site	unknown	unknown	various areas of the site
Waste Oil	2,000 gallons	late 1960's-1987	unknown	former underground storage tank area
Gasoline	2,000 gallons	late 1960's-1987	unknown	former underground storage tank area
Diesel Fuel	2,000 gallons	late 1960's-1987	unknown	former underground storage tank area
Heating Oil	2,000 gallons	late 1960's-1987	unknown	former underground storage tank area
Contaminated Soil	75 feet ³	late 1960's-1987	unknown	area near underground storage tanks (removed with the tanks)

[MA DEP, 1988; Stone & Webster, 1995a]

WASTE/SOURCE SAMPLING

A summary of the past sampling events at the Vitale Flyash Pit are as follows:

- *Haley & Aldrich performed an Environmental Assessment on November 26, 1984. Five borings logs indicated that the site has been filled with fly ash to a depth of 14 to 36 feet below grade. Groundwater was observed at 10 to 21 feet below grade. Cambridge Analytical Associates, Inc. analyzed composite soil samples from the above mentioned borings at the site and reported finding 100 ppb of methylene chloride, 20 ppb of 1,2-dichloroethane, 300 ppb of 1,1,1-trichloroethane and a trace of naphthalene. These contaminants are found in solvents and degreasers. Naphthalene is used in a variety of products and industrial processes. These compounds are considered to be toxic and methylene chloride and 1,2-dichloroethane are suspected carcinogens (the SSI did not state who considers these contaminants to be toxic).*
- ▶ *The 1988 Test Pit Investigation began with a magnetometry survey and a terrain conductivity survey were completed. Several areas exhibited anomalous readings and were revealed and perceived as containing buried drums. Test pits were excavated at these locations (figure 3). The test pit investigations did not reveal the presence of buried steel drums as only flyash and municipal-type refuse were encountered (see Table 5). Eight flyash samples were collected from the test pits and analyzed for toxicity with the Extraction Procedure Toxicity (EP toxicity) test method, VOC content, and semivolatile acid/base/neutral extractables. The flyash samples passed the EP toxicity test for all eight RCRA metals. VOCs and base/neutral extractables were not detected in flyash samples.*
- ▶ *Of the eight ash samples tested for Volatile Organic Compounds (TP-1, TP-3, TP-6, TP-7, TP-10, TP-13, TP-19, TP-14) by Method 8240 (purge and trap technique), TP-1 contained 0.2 ppm of Ethylbenzene and TP-14 contained 0.3 ppm of m-, p-Xylene.*

- None of the five samples (TP-1, TP-6, TP-7, TP-10, TP-13) analyzed for Acid, Base, Neutral extractable compounds by Method 3550 (Sonication Extraction) on June 27, 1988 revealed concentrations of contaminants above detection limits.

Table 5 summarizes the testing performed for the test pit samples, and Table 6 summarizes the metals analysis results from the test pits.

**TABLE 5: SUMMARY OF TEST-PIT INVESTIGATION RESULTS FOR
THE VITALE FLYASH PIT**

Test Pit I.D.	Total Depth (ft)	Ash Thickness (ft)	Refuse	Comp Soil PID Reading	GW pH	GW Specific Conductance	Ash Sampling
TP-1	11	8	No	5.0	Dry	Dry	VOC, ABN, Metals
TP-2	12	9	No	0.5	6.68	590	NA
TP-3	12	9	No	5.0	6.83	1040	VOC
TP-4	13	10	No	2.0	NS	NS	NA
TP-5	13	10	No	0.1	6.75	385	NA
TP-6	9	6	No	0.2	7.03	1308	VOC, ABN, Metals
TP-7	15	12	No	4.0	Dry	Dry	VOC, ABN, Metals
TP-8	16	14+	No	0.1	Dry	Dry	NA
TP-9	16	14+	No	0.0	Dry	Dry	NA
TP-10	14	13+	Yes	0.1	Dry	Dry	VOC, ABN, Metals
TP-11	15	12+	No	0.0	Dry	Dry	NA
TP-12	15	13+	No	0.0	Dry	Dry	NA
TP-13	15	15+	Yes	0.4	Dry	Dry	VOC, ABN, Metals
TP-14	8	7	Yes	35	6.20	595	VOC
TP-15	12	12+	Yes	1.3	6.29	1080	NA
TP-19	10	10+	Yes	7.0	Dry	Dry	VOC
TP-20	15	12+	Yes	0.0	Dry	Dry	NA
TP-21	14	13+	No	0.1	Dry	Dry	NA

ABN = Acid/Base/Neutral

VOC = Volatile Organic Compounds

NA = Not Analyzed

NS = No Sample

(Normandeau, 1988)

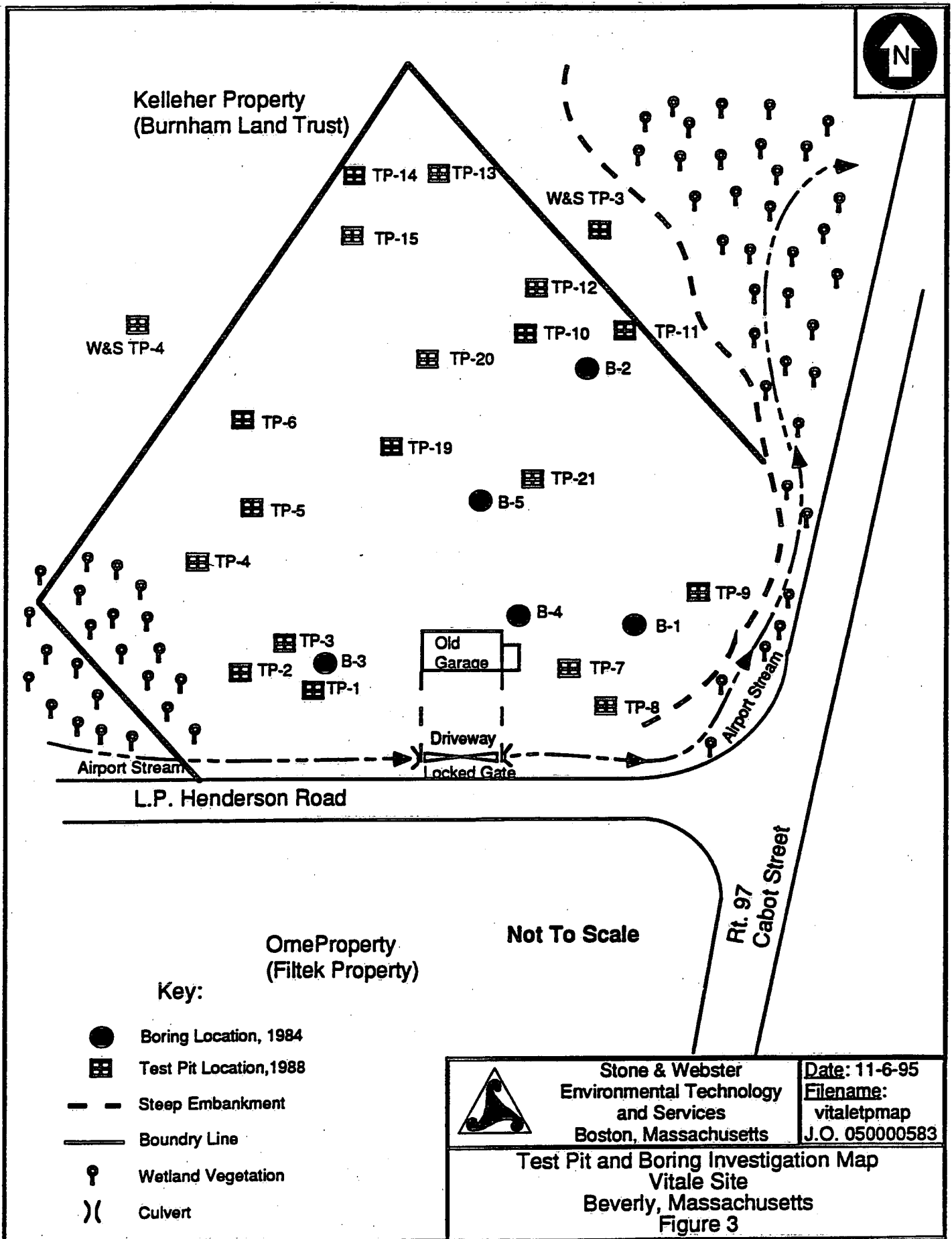


TABLE 6: METALS ANALYSIS FOR ASH SAMPLES COLLECTED FROM TEST PITS

Metal	TP-1	TP-6	TP-7	TP-10	TP-13
Arsenic	76.4	64.9	164	76.8	93.7
Barium	1090	999	1234	1043	976
Beryllium	6.4	5.2	7.56	4.56	4.82
Boron	<54.8	<54.8	<51.8	131.6	62.6
Cadmium	1.37	1.41	<1.3	3.39	1.97
Chromium	37	34.1	36.8	40	41.1
Copper	71.7	61.7	74.3	59.3	54.1
Lead	31.5	26.0	32.2	27.2	32.7
Molybdenum	14.4	<12.0	<11.0	17.5	13.3
Nickel	33.0	28.9	31.4	34.5	53.2
Selenium	<13.7	<14.1	<12.6	16.2	14.6
Strontium	551	419	475	654	497
Vanadium	100	90.5	88.4	143	350
Zinc	38.1	33.3	36.3	50.0	40.5

* Note: Antimony, Boron, Mercury, Silver and Thallium were detected below their SQL's
Expressed in milligrams per kilogram
(Normandeau, 1988)

GROUNDWATER PATHWAY

The population within four miles of the Vitale Flyash Pit is identified in a report called CENTRACTS. CENTRACTS uses the 1990 Block Group population and Block Group house count data found in the Census Bureau's 1990 STF-1A files. The groundwater supply data is also supplied by the CENTRACTS report from the Bureau's 1990 STF-3A files. CENTRACTS reports are created with programs written by Frost Associates of Essex, Connecticut. According to CENTRACTS, the groundwater use within four miles involves a population of 875 people on private wells in seven cities or towns using a total of 276 drilled wells and 80 dug wells. The nearest private well services an estimated average population of 2 people and is located between a half to a quarter mile from the site (S&W, 1995b).

Three public groundwater drinking supplies fall within a four mile radius of the Vitale Flyash Pit. These water supplies are for the cities/towns of Wenham, Hamilton and Topsfield.

The Town of Wenham uses two municipal wells (Well 1 and Well 2) for their public water supply. Well 1, a 55 foot deep, gravel packed well is the primary water source, serving the entire population of Wenham at 4,073 people. Well 2, a 75 foot gravel packed well, is a reserve well. The wells are located off of Juniper Street, roughly 1.8 miles northeast of the Vitale Flyash Pit. Both of these wells are surrounded by a large Wellhead Protection Area, which extends into three towns (Wenham, Hamilton, Topsfield)(GIS, 1995). This drinking water is treated with sodium chloride (S&W, 1995c).

The Town of Hamilton has five groundwater wells that supply drinking water to 7,200 of its total 7,500 residents. The primary source consists of three wells (Idlewood 1, Idlewood 2 and a Cason well) which supply approximately 80% (5,760 people) of the Hamilton population. The depth of all the wells range between 30-50 feet. The three primary wells are located off of Pine Tree Drive approximately 2.3 miles northeast of the Vitale Flyash Pit and consist of two gravel packed wells and one Cason well. The other source of water is the Asbury Well which supplies 20% (1,440 people) of the Hamilton population. This gravel packed well is located off of Asbury Street roughly 2.9 miles northeast of the site. The School Street well is a gravel packed reserve well used only in times of need and is located on School Street approximately 3 miles northeast from the site. All of the wells are located in a large Wellhead Protection Area which encompasses three towns (GIS, 1995). Fluoride is currently added, and the Town of Hamilton is in the process of setting up a treatment system for iron and manganese removal and sodium hyper chloride addition (S&W, 1995d).

The Town of Topsfield supplies water for a population of 5,936 people with two well fields. The North Street Well Field consists of 40, 2.5" driven wells supplying 84% of the population on municipal water (4,986 people), while the Perkins Row Well Field consists of 20, 2.5" driven wells supplying 16% of the population on municipal water (950 people). The North Street Well Field is located off of North Street, approximately 3.5 miles northwest from the Vitale Flyash Pit. The Perkins Row Well field is located off of Perkins Row, roughly 3 miles northwest of the site. The North Street Well field is used as the major water supply, due to a leaking underground storage tank containing gasoline, located about one half mile from the Perkins Well field. There has not been any contamination detected in the Perkins Row Well Field water supply, but as a precautionary measure the supply was reduced to 16%. CEA Environmental Services is conducting quarterly groundwater testing to monitor the impact of the leak. The drinking water is treated with fluoride (S&W, 1995e).

Tables 7 and 8 summarize the groundwater usage within a four mile radius of the site.

**TABLE 7: PUBLIC GROUNDWATER SUPPLY SOURCES WITHIN
FOUR MILES OF VITALE FLYASH PIT**

Distance/ Direction from Site	Source Name	Location of Source	Estimated Population Served	Source Type
1.8 miles/NE	Well 1 Well 2	Juniper Street Wenham, MA	4073	2 gravel packed
2.0 miles/E	School Street Well	School Street Hamilton, MA	4073 Reserve Well	1 gravel packed
2.3 miles/NE	Idlewood 1 Idlewood 2 Cason	Pine Street Hamilton, MA	5760	2 gravel packed 1 Cason well
2.9 miles/NE	Asbury Street Well	Asbury Street Hamilton, MA	1440	1 gravel packed
3 miles/NW	Perkins Row Well Field	Perkins Row Topsfield, MA	950	20, 2.5" driven wells (overburden)
3.5 miles/NW	North Street Well Field	North Street Topsfield, MA	4986	40, 2.5" driven wells (overburden)

[S&W, 1995c; S&W, 1995d; S&W, 1995e]

TABLE 8: ESTIMATED DRINKING WATER POPULATIONS SERVED BY GROUNDWATER SOURCES WITHIN FOUR MILES OF VITALE FLYASH PIT

Radial Distance From Vitale Flyash Pit (miles)	Estimated Population Served by Private Wells	Estimated Population Served by Public Wells	Total Estimated Pop. Served by GW Sources
0.00 < 0.25	0	0	0
0.25 < 0.50	2	0	2
0.50 < 1.0	30	0	30
1.0 < 2.0	115	4,073	4,188
2.0 < 3.0	270	7,200	7,470
3.0 < 4.0	435	5,936	6,371
TOTAL	852	17,209	18,061

[Frost, 1995; S&W, 1995c; S&W, 1995d; S&W, 1995e]

An Environmental Assessment conducted in November 1984 by Haley & Aldrich concluded that groundwater is present between 10 and 21 feet below grade. The groundwater at the site flows east toward Wenham Lake (MA DEP, 1988). There are twelve on-site monitoring wells ranging in depth between 30 and 60 feet. These wells were installed in June 1988 by Jetline Services and sampled in July 1988 by Normadeau Engineers, Inc. The monitoring locations are shown on Figure 2. The groundwater samples along with Airport Stream water and sediment samples were analyzed for the presence of volatile organic compounds, acid and base/neutral compounds, metals, cyanide, sulfides, pesticides, herbicides, and ammonia (Normandeau, 1988).

The results from the July 1988, Normandeau Engineers, groundwater sampling event are summarized as follows:

- Total benzene was detected in monitoring wells MW-3S at 2 ppb and in MW-7S at 31 ppb, toluene at 2 ppb in MW-3S and MW-7S at 3 ppb, Ethyl benzene at 40 ppb and in MW-3S and MW-7S at 13 ppb, and xylene at 132 ppb in MW-3S and at 156 ppb in MW-7S (BTEX). Normandeau concluded that the source of BTEX concentrations for MW-7S is most likely from a gasoline underground storage tank that was removed in 1986 and showed signs of leakage. The source of the BTEX contamination of MW-3S is unknown.
- Halogenated solvents (1,2-dichloroethane, 1,1,1-trichloroethane, and trichloroethane) were detected in MW-1S at concentrations ranging from 3-8 ppb.
- Acid and base/neutral compounds, sulfides, herbicides, and pesticides were not detected above detection limits in any of the groundwater samples.
- Arsenic was detected in MWV-3D, MW-4S, MWV-2S, MWV-2D, MWV-2D and MWV-3S at concentrations ranging between 0.052 to 0.191 mg/L.
- Selenium was also detected at levels above allowable drinking water standards at concentrations ranging from 0.057-0.028 mg/L in MW-4S, MWV-2S, MWV-2D.
- Manganese was detected in all of the 12 wells at concentrations ranging from 0.2-8.9 mg/L, and in 10 wells at concentrations exceeding allowable drinking water standards.
- Sodium was detected in three wells above the allowable drinking water standards (MW-8S at 20.69 mg/L, MWV-1S at 583 mg/L and MWV-3S at 22.01 mg/L). Normandeau concluded the use of saltwater to quench the fly ash is probable the source of sodium.
- Cyanide was detected at 0.159 mg/L in MW-5S. This contaminant may be attributable to a site south of the Vitale Flyash Pit known as the Orne Property, which has cyanide contamination (MA DEP, 1988). There is currently remedial activity at this property (S&W, 1995f).

- Iron was detected above drinking water standards at concentrations ranging from 1.0-98.65 mg/L in MWV-3D, MW-3S, MW-5S, MW-6S, MW-7S, MW-8S, MWV-2D, and MWV-3S.
- Aluminum was detected at 3.0 mg/L in MWV-1S.

SURFACE WATER PATHWAY

The Vitale Flyash Pit falls in the Zone C area of the FEMA Flood Frequency Map. Zone C is designated as an area with minimal flooding (area outside of 500 year plain). The general terrain of the site slopes down at a 2% grade towards Wenham Lake which is east of the site (MA DEP, 1988). The surface water drainage flows into the Airport Stream which travels east and empties into Wenham Lake (0.25 miles downstream), a public water supply for the Cities of Beverly and Salem, MA (S&W, 1995b). As a result of disposal activities at the Vitale Flyash Pit, a delta of fly ash has been formed at the convergence of the Airport Stream into Wenham Lake. The drinking water intake is located 2.0 miles downstream from the site at the southern most point in the lake (Figure 4). Water drawn from the lake serves approximately 80,000 persons (S&W, 1995b). The Miles River flows north from Wenham Lake and empties into the Ipswich River 11.2 miles downstream of the site. The Ipswich River flows northeast to Plum Island Sound and Ipswich Bay in Ipswich, Massachusetts. The 15-mile downstream pathway ends in the Plum Island Sound tidal flats at the mouth of the Ipswich River (GIS, 1995).

The Airport Stream and Wenham Lake are classified by the Massachusetts Division of Water Control (MDWPC) as Class A water bodies. Class A water is defined as a source of public drinking water which is an excellent habitat for fish, other aquatic life, and wildlife. Class A is suitable for primary and secondary recreational usage and as such are protected by additional MDWPC regulations. The Miles River and the Ipswich River (to the 13 mile downstream mark) are classified as Class B, High Quality water bodies. Class B water bodies are suitable as public water supplies with appropriate treatment. They are also excellent habitats for fish and other aquatic life, and are suitable for agricultural and industrial process uses. High Quality waters are protected by additional MDWPC regulations. The Ipswich River, upstream of the 13-mile mark, is considered to be a Warm Water Fishery. Waters designated as such are unable to support year round populations of cold-water aquatic life. The last two miles of the surface water pathway consist of a Class SA water bodies which are similar to Class B waters but are also approved for shellfish harvesting without deprivation (TRC, 1991).

The Massachusetts Division of Fisheries and Wildlife has no information regarding fisheries in the Miles River and Wenham Lake is a drinking water supply, thus fishing is illegal; however evidence of these activities have been observed at Wenham Lake. The Ipswich River is stocked with rainbow and brown trout, both of which are fished recreationally. Other species likely to be present include sea trout, striped bass, shad, American and lamprey eel, pickerel, sunfish, bluegill, yellow perch, large mouth bass, and shiners. Commercial harvesting of soft shell clams, winter flounder, and cod occurs in the Plum Island Sound. In addition to these species, surf clams, mussels, mackerel, and bluefish are recreationally harvested from Plum Island Sound (TRC, 1991).

There is approximately 25 miles of wetland frontage along the 15 mile downstream pathway. These wetlands consist of estuarine, tidal, and marine wetlands which are located near the end of the 15-mile surface water pathway at the mouth of the Ipswich River (USGS, 1985). Numerous occurrences of animal species designated as endangered or threatened by the MA Division of Fisheries and Wildlife and one by the Federal Endangered Species Act have been noted in the 15-mile drainage pathway (US EPA, 1995). Table 9 summarizes the endangered species.

Analysis by the Department of Public Health Lawrence Experiment Station of the water samples taken from the Airport Stream on 1/24/75, downstream from the site revealed elevated levels of total coliform, fecal coliform, suspended solids, total solids conductivity, iron, chloride, sodium, ammonia, pH, and alkalinity when compared to upstream samples. No VOCs or priority pollutants were found above detection limits in the downstream surface water samples (DEP, 1987).

The most recent surface water samples were collected by the MA DEP in 1986 from the Airport Stream. The location of these samples is upstream from the Vitale Flyash Pit, point A, at the intersection of the Airport Stream and Route 97 (just downstream from the Vitale Flyash Pit), point B, and at the discharge point of the Airport Stream to Wenham Lake, point C. Based on the SSI information, the estimated locations of these samples are shown on Figure 4. These samples were analyzed for VOCs, metals, total coliform, fecal coliform, total solids, suspended solids, pH, alkalinity, chloride and ammonia. From these samples, concentrations were detected above detection limits for total coliform, suspended solids, total solids, conductivity, iron, chloride, sodium, ammonia, pH, and alkalinity. Downstream samples reflected higher concentrations of these contaminants when compared to upstream samples (MA DEP, 1988). A surface water sample analyzed for VOCs, total metals, cyanide, ammonia and sulfide was collected at an unknown location from the Airport Stream during monitoring well sampling by Normandeau in 1988. The only contaminants detected above detection limits in this sample was iron at 0.394 mg/L and manganese at 0.208 mg/L (Normandeau, 1988).

TABLE 9: RARE AND ENDANGERED SPECIES WITHIN THE 15 MILE DOWNSTREAM DRAINAGE PATHWAY OF THE VITALE FLYASH PIT

Species Type	Class	State Status	Federal Status	Distance Site (mile)
Vertebrates	Aves	Endangered	none	0.2
Vertebrates	Amphibia	Concerned	none	1.1
Vertebrates	Aves	Endangered	none	2.5
Vertebrates	Aves	Endangered	none	3.0
Vascular Plants	Monocotyledonea	Concerned	none	3.0
Vertebrates	Amphibia	Concerned	none	3.0
Vertebrates	Aves	Endangered	none	3.1
Vertebrates	Amphibia	Concerned	none	3.3
Vascular Plants	Dicotyledoneae	Concerned	none	3.4
Vertebrates	Amphibia	Concerned	none	3.9
Vertebrates	Amphibia	Concerned	none	3.9
Vertebrates	Amphibia	Concerned	none	3.9
Vertebrates	Amphibia	Concerned	none	4.0
Vertebrates	Amphibia	Concerned	none	5.0
Invertebrate	Malacostraca	Concerned	none	7.0
Invertebrate	Insecta	Endangered	none	8.7
Vertebrates	Aves	Concerned	none	10.1
Vertebrates	Aves	Threatened	Endangered/ Threatened	10.5
Vertebrates	Aves	Concerned	none	10.8
Vertebrates	Aves	Concerned	none	10.8

(US EPA, 1995)

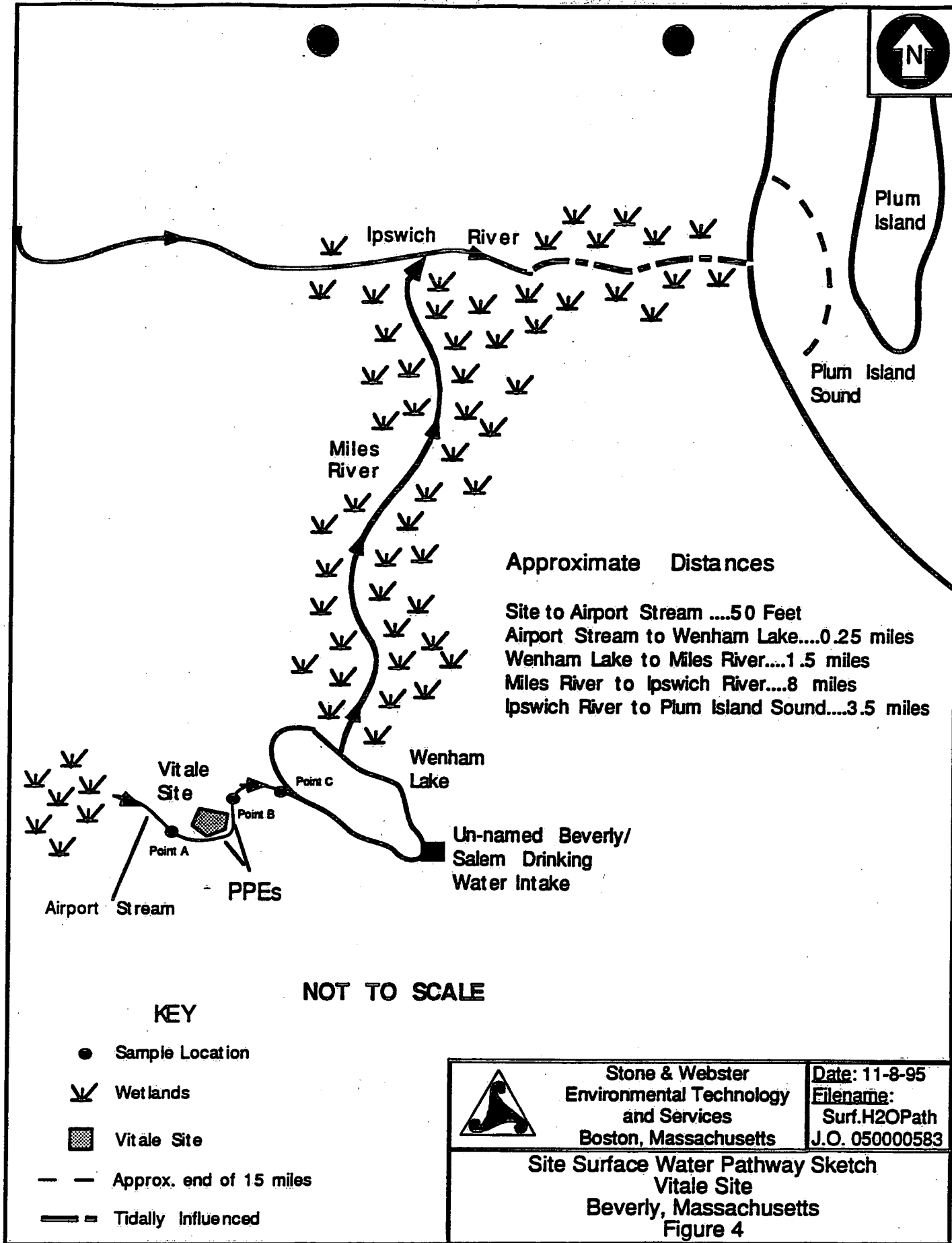


Table 10 summarizes the water bodies within the fifteen mile surface water segment of the Vitale Flyash Pit site and Table 11 lists the drinking water intakes along the downstream pathway.

TABLE 10: WATER BODIES WITHIN THE SURFACE WATER SEGMENT OF THE VITALE FLYASH PIT

Surface Water Body	Descriptor ^a	Length of Reach	Flow Characteristics (cfs) ^b	Length of Wetlands
Airport Stream	Minimal Stream	0.25 miles	0-10	0.25 miles
Wenham Lake	Shallow ocean zone or Great Lake	1.5 miles	unknown	0.1 miles
Miles River	Small to Moderate Stream	8 miles	10-100	8 miles
Ipswich River	Small to Moderate Stream	3.5 miles	10-100	3.5 miles
Plum Island Sound	Coastal Tidal Waters	2.75 miles	NA	2 miles

^a Minimal stream. Small to moderate stream. Moderate to large stream. Large stream to river. Very large river. Coastal tidal waters. Shallow ocean zone or Great Lake. Deep ocean zone or Great Lake. Three-mile mixing zone in quiet flowing river.

^b Cubic feet per second.

(USGS, 1985)

TABLE 11: DRINKING WATER INTAKES ALONG THE 15-MILE DOWNSTREAM PATHWAY FROM VITALE FLYASH PIT

Intake Name	Water Body	Downstream Distance From PPE	Flow Rate at Intake	Estimated Population Served
un-named	Wenham Lake	2.25 miles	11 MGD	80,000

(S&W, 1995b)

Wenham Lake is the drinking water supply for the Cities of Beverly and Salem. Wenham Lake serves roughly 80,000 people with an average output of 11 MGD. A sufficient supply of drinking water for Wenham Lake is maintained by three reservoirs. These reservoirs are the Putnamville Reservoir in Danvers, the Longham Reservoir in Beverly and the Ipswich River in Topsfield. From these reservoirs enough water is channeled into Wenham Lake to fill the lake approximately four times a year. Longham reservoir and the Ipswich River are used as a supplement supplies for the Putnamville Reservoir which is a man made pump and storage reservoir for Wenham Lake. The Ipswich River and Wenham Lake are both part of the Vitale Flyash Pit fifteen mile drainage pathway, however the Ipswich River intake is upstream from the intersection of the Miles River and the Ipswich River.

Around Wenham Lake there is a water shed protection area in which the Vitale Flyash Pit is located in. The Wenham Lake supply has not had any problems meeting drinking water permit limits (Nolton, 1995).

SOIL EXPOSURE PATHWAY

During the 1995 site reconnaissance, mounds of flyash were noticed eroding into low-lying areas on the northern portion of the site. Flyash was also noticed on and mixed in with the surface soil (US EPA, 1995). Surface soil samples have never been collected at the Vitale Flyash Pit, however composite boring samples between three and nine feet (flyash) contained heavy metals (Normandeau, 1988).

Composite soil samples were also collected by Haley & Aldrich in 1984 at three, six, and nine feet below the surface of the site from five boring locations. These samples were analyzed for VOCs by method 601, Acid/Base/Neutral (ABN) by method 8270 and priority pollutant metals by method 8270 by Cambridge Analytical, Inc. No ABNs were detected above detection limits in the samples. VOC contamination of methylene chloride was found at 100 ppb; 1,2-dichloroethane was found at 20 ppb, 1,1,1-trichloroethane was found at 300 ppb and trace concentrations of naphthalene were identified (Normandeau, 1988). The priority metals were not compared to a background sample. However, in comparing the concentrations of these metals to the MA DEP Background Soil Concentrations, five of the thirteen metals are greater than three times these background concentrations. These metals are arsenic at 71 micrograms per gram (ug/g), beryllium at 5.1 ug/g, nickel at 62 ug/g, selenium at 33 ug/g and silver at 3 ug/g. The other seven metals were either at concentrations below detection levels or below three times the MA DEP Background Soil Concentrations (MA DEP, 1995).

In 1986, MA DEP inspectors observed oil-stained soil at the site in the vicinity of four underground storage tanks which were located near the lone one-story building. The contents of the tanks were reported as gasoline, diesel fuel, heating fuel, and waste oil. The tanks were removed in 1987. At least one of the tanks was discovered to have leaked, and seventy-five cubic yards of contaminated soil from around the leaky tank and in the area of the surface soil staining was excavated and removed off-site (MA DEP, 1988). The stained soil was not noticed during the Stone & Webster site reconnaissance.

There are no schools, day cares or residents or terrestrial sensitive environments within 200 feet of the site. The nearest residence is located 500 feet to the east. The table 12 summarizes the population within four miles of the site.

AIR PATHWAY

The prevalent wind direction for the site is out of the west at 10 knots (S&W, 1995g). The nearest potential receptor is the nearest resident located roughly 500 feet to the east of the site. Wetland vegetation was noticed along the Airport Stream on site. The Airport Stream flows to the east along the southern portion of the site then curves flowing north along the eastern portion of the site, before heading east and discharging into Wenham Lake approximately 0.25 miles from the site (Figure 1)(S&W, 1995f). The population residing within four miles of the site consists of 80,640 people (Frost, 1995). There is approximately a total of 30 acres of wetlands located within a mile of the site (USGS, 1985).

On June 13, 1973 Massachusetts Department of Natural Resources (DNR) sent a letter to Stephen Vitale notifying him that residents living on Trask Street, 500 feet away to the east, have complained that flyash is eroding into the swamp and stream, resulting in a damming effect and flooding their yards. Additionally, these neighbors complained of a "severe dust problem" in the summer months when the flyash dumped on-site dried and became airborne. DNR requested that Mr. Vitale immediately stabilize the piles of flyash (MA DEP, 1988).

In June 1988, Applied Occupational Health Systems (AOHS) collected three air samples at the Vitale Flyash Pit, as part of the health & safety plan during drilling. Two of the samples were release samples and one was a blank sample. These air samples were analyzed for six metals (arsenic, copper, chromium, lead, and selenium). The only hazardous substance detected above detection limits was arsenic at 2 ppb (Normandeau, 1988).

In July 1988, AOHS returned to the Vitale Flyash Pit and collected three air samples as part of a health & safety plan. The air samples were analyzed for the same metals as in June (two release samples were collected and one trip blank). On this sampling event, no compounds in air media analyzed for were found above detection limits (Normandeau, 1988).

On October 17, 1992 the Beverly Fire Department extinguished a fire at the one-story structure on the Vitale Flyash Pit; no hazardous materials were present in the building (S&W, 1995a).

TABLE 12: ESTIMATED POPULATION WITHIN FOUR MILES OF THE VITALE FLYASH PIT

Radial Distance From Vitale Flyash Pit (miles)	Estimated Population
0.00 < 0.25	259
0.25 < 0.50	655
0.50 < 1.00	2,453
1.00 < 2.00	15,605
2.00 < 3.00	31,060
3.00 < 4.00	30,608
TOTAL	80,732

(Frost, 1995)

SUMMARY AND CONCLUSIONS

The Vitale Flyash Pit is located in Beverly, Massachusetts on L.P. Henderson Road, one of the access roads to the Beverly Municipal Airport. The site coordinates are 42° 54' 27" north latitude and 70° 35' 16" west longitude. The eighteen acre site is an abandoned gravel and sand mine formerly owned by Michael and Stephen Vitale (the Vitale brothers acquired the property in the 1950's). A one story building on the property and sand and gravel excavated from the property was used in conjunction with their construction company. In 1980, the City of Beverly Conservation Commission gained ownership of the site from the Vitale brothers for failure to pay property tax.

While under ownership of the Vitale brother's, the entire site was used as a unpermitted landfill with no records of what was disposed of and the associated quantities. This uncertainty lead to a magnetometry and terrain conductivity survey of the site in 1988, to determine the possibility of buried drums on-site. Several areas exhibited anomalous readings and were perceived as containing buried drums. Test pits were excavated at these locations. The test pit investigation did not reveal the presence of buried steel drums; only refuse was found in the test pits.

The main source of contamination onsite is saltwater quenched fly ash. The Vitale brother's accepted flyash from the New England Power Company to fill the excavation pits at their property. Other sources on-site consist of junk piles containing household appliances, vehicle parts and junked vehicles.

The Vitale Flyash Pit has a long record of noncompliance with local and State laws and regulations. The first official documentation of this in MA DEP records is a letter dated March 25, 1969 regarding a Massachusetts Division of Water Pollution Control inspection of the Vitale property. The document noted that holes at the site were being filled with fly ash without the necessary Beverly Board of Health permit, as required by MGL Chapter 11 Section 150A.

On September 17, 1971 a Subpoena, Notice and Restraining Order were issued by the Department of Wetlands to Michael and Stephen Vitale, their construction companies and subcontractors to refrain from any more work impacting the wetland at the site as it is a violation of MGL Chapter 131 Section 40. On June 13, 1973, the Massachusetts Department of Natural Resources (DNR) sent a letter to Stephen Vitale notifying him that residents living on Trask Lane 500 feet away to the east, have complained that fly ash is eroding into the swamp and stream causing a damming effect and flooding their yards. Additionally, these neighbors complained of a "severe dust problem" in the summer months when the fly ash dumped on-site dries and becomes airborne. DNR requested that Mr. Vitale immediately stabilize the piles of fly ash.

On August 26, 1974, the Beverly Board of Health notified Steven Vitale that the fly ash disposal area constituted illegal disposal and was in violation of MGL Chapter 111, Section 122. Mr. Vitale was also notified that this filling was also a violation of the Hatch Act in addition to creating a water pollution problem.

Flyash is buried beneath the surface soil at the property at depths ranging between 14 to 36 feet, and groundwater is present between 10 and 21 feet below grade on the property. Flyash has been observed on the surface of the site and flyash has been observed eroding from the property into the low lying areas near and into the Airport Stream (nearest surface water body).

Targets potentially affected by the site are the residents from the Cities of Beverly and Salem (80,000 people) consuming water from Wenham Lake, 0.25 miles downstream from the flyash pit. Also there are over 25 miles of wetlands, and 20 endangered, threatened, or species of concern by state or federal standards exist within the fifteen mile surface water pathway. The nearest public groundwater drinking water supply is approximately 1.8 miles to the northeast. This well serves a population of approximately 4,073 people. There are 2 people within one half mile of the flyash pit on private wells. The Vitale Flyash Pit is unrestricted to pedestrians and the nearest residence to the flyash pit is 500 feet to the east. There is a locked gate at the access road of the flyash pit to prevent vehicle access.

Extensive groundwater sampling at the site occurred in 1988 during a Normandeau investigation. The results of the investigation concluded that Volatile Organic Compounds (VOCs) consisting of Benzene, Toluene, Ethylbenzene, and Xylenes (total BTEX) is present in two of the twelve monitoring wells at 176 ppb. These contaminants are believed to result from one of four underground storage tanks containing petroleum products, which was observed to be leaking during removal in 1986. Heavy metals were also detected in most wells. The metals and their maximum concentrations were aluminum at 3.0 milligrams per liter (mg/L), arsenic at 0.191 mg/L, iron at 98.65 mg/L, manganese at 8.9 mg/L, selenium at 0.057 mg/L, and sodium at 583 mg/L. These metals are believed to be a result of leaching from the flyash, the main source on-site. Cyanide was also found at 0.159 mg/L in one of the monitoring wells.

The fifteen mile surface water pathway begins at the Airport Stream which flows past the southern and eastern portions of the site. There are two probable points of entry (PPEs) for runoff to enter surface water from the Vitale Flyash Pit. One on the eastern portion and one on the northern portion of the flyash pit. The Airport Stream flows 0.25 miles into Wenham Lake, a surface drinking water supply for 80,000 people. Wenham Lake flows into the Miles River then to the Ipswich River which flows into Plum Island Sound.

Surface water sampling of the Airport Stream which receives the overland flow (run-off) from the site, occurred in 1986. The results of this sampling showed iron, manganese, total coliform and fecal coliform significantly above (3 times) the upstream sample concentrations. Flyash and volatile organic compounds (VOCs) were not detected in the surface water samples. However, flyash has been observed forming a delta at the Airport Stream discharge point in to Wenham Lake. This delta was observed by the Massachusetts Department of Environmental Protection (MADEP) in 1987.

Surface soil sampling has not been conducted at the Vitale Flyash Pit, however fly ash samples were obtained and analyzed for metals and VOCs from twelve test pits. The results concluded that the flyash contains a number of heavy metals.

Air sampling was conducted at the Vitale Flyash Pit in June and July of 1988, during installation of monitoring wells. The air sampling conducted during the June event detected arsenic at 2 ppb. The July sampling event results found no contaminants above detection limits.

The flyash pit is abandoned and there are no workers, residents, schools, or day-care facilities on the property. An estimated population of 3,458 live within 1 mile of the site. An estimated population of 80,732 live within four miles of the site.

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